



Left: a bleached *Acropora cytherea* table, with a fully pigmented younger *Acropora* beneath.
Main photo: *Lobophyllia corymbosa* (beside two small, bleached *Favia* colonies).
Right: a *Porites* colony, mostly bleached but with a good patch of healthy tissue.

Coral bleaching

Coral bleaching occurs when coral animals expel the algal cells which usually live in their tissues. The algal cells (called zooxanthellae) are deeply pigmented with chlorophyll, giving a dominant green-brown colour to the whole colony. The remaining coral tissue is mostly transparent, so that when the algae are ejected, the white limestone skeleton shows through.

Expulsion of algae by the coral is triggered by several environmental factors, warming being an important one. Strong light exacerbates it greatly. Either or both factors cause a breakdown in the Photosystem II component of the complex photosynthetic pathway. The algal cells are regulated to a degree by the coral animal, and can be ejected when they die and break down.

The bleached coral remains alive, for a while at least. Even heavily bleached coral may still retain a number of the minute zooxanthellae, possibly enough to recolonise at a later date and restore the coral to health. Or, the coral may die. Which outcome occurs depends on how great the temperature rise was, and how long the warming period lasted. Exact values vary between species and locations, but a measure of about 10 'degree heating weeks' (e.g. 1.5 degrees rise above expected for 6 or 7 weeks) has become a useful measure for estimating whether mortality will follow. Branching corals like *Acropora* (left) are very susceptible, while the massive *Porites* forms (right) are the most tolerant. Some corals may become recolonised by more heat resistant strains after bleaching, as there is considerable regional difference between the susceptibility of corals: many species living in the Persian Gulf, for example, annually survive temperatures which readily kill the same coral species in Chagos.

The illustration shows Chagos corals which are partially bleached only, to show the contrast between healthy and bleached tissue. All were taken in 2005 when temperature rise was enough to trigger some bleaching, but not lethally high for most. These corals probably recovered.

After bleaching completely, a coral may survive for a few weeks. If it cannot become recolonised with more symbiotic algae, it dies, and the animal tissue sloughs off. The exposed limestone skeleton is then quickly colonised by small seaweeds and burrowing animals, so its white surface quickly darkens again. Satellite tracking of massive bleaching events can only catch bleaching during the relatively brief, pale stage.

The Chagos Conservation Trust is a charity (Registered in the UK No. 1031561), whose aims are to promote conservation, scientific and historical research and to advance education concerning the archipelago. The Trust is a non political association.

If you would like to know more visit www.chagosconservationtrust.org or contact the Secretary at simonhughes@hughes-mccormack.co.uk